History and Geomorphology of North Slough, 1906 through 2002

North Slough, a side channel in the Quinault River system, is located on the north side of the Quinault River valley between RK 11.5 and RK 13.6 (Figure 1). It is between Big Creek (downstream) and a bedrock knob that extends into the valley (upstream) near RK 14.

Terrace channels are present on the terraces both north and south of the Quinault River. The ones on the south side extend from upstream of Fletcher Slough to the North Slough area (Figure 1). The ones on the north side extend from the North Slough area to Big Creek (Figure 1). The characteristics of these terrace channels area discussed in the sections on Fletcher Slough and Big Creek.

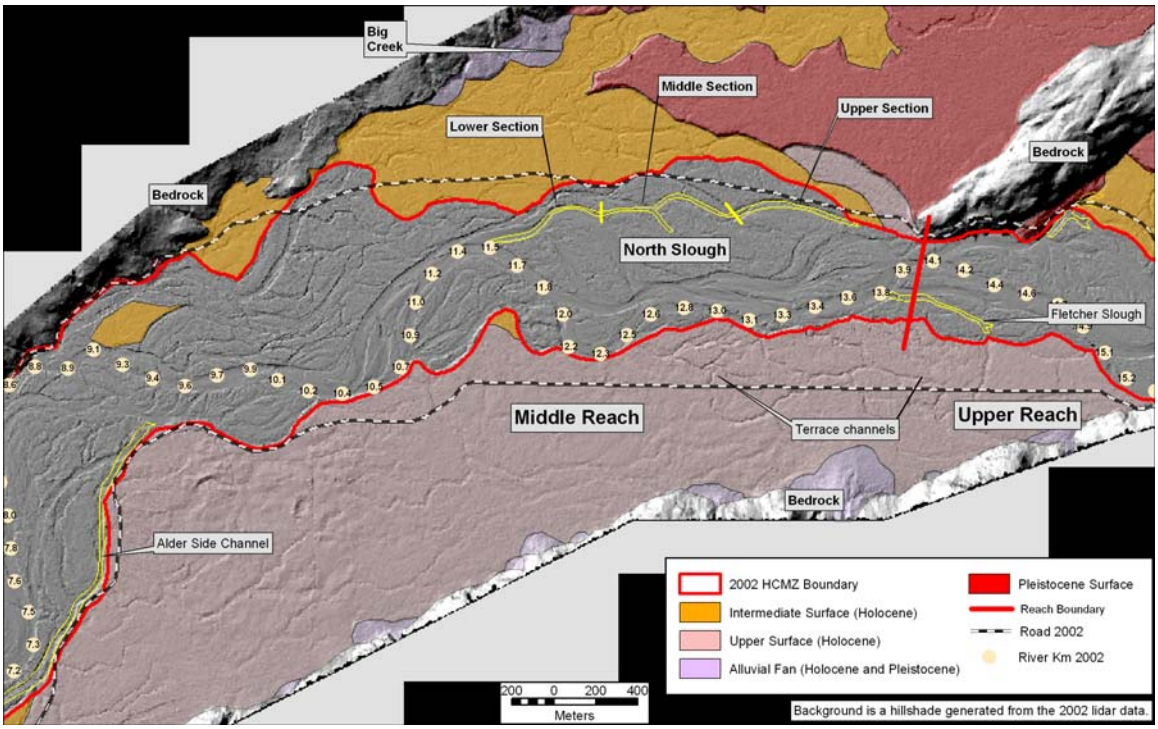

Figure 1. North Slough is located between RK 11.5 and RK 13.6 along the north side of the historical channel migration zone (HCMZ). Background is a hillshade created from 2002 LiDAR data. River kilometers are from the low-flow channel at the time of a river survey in 2002.

The following maps (Figures 2 through 11) show the history of formation and destruction of potential habitat in the area of North Slough between 1906 and 2002.

North Slough has been subdivided into three sections for discussion, primarily on the basis of the history of formation of different parts of the slough (Figures 2 through 11). The Upper section is about 630 m long beginning at the upstream end of the slough. The Middle section extends between 630 m and about 1330 m downstream.

Changes in North Slough by Year

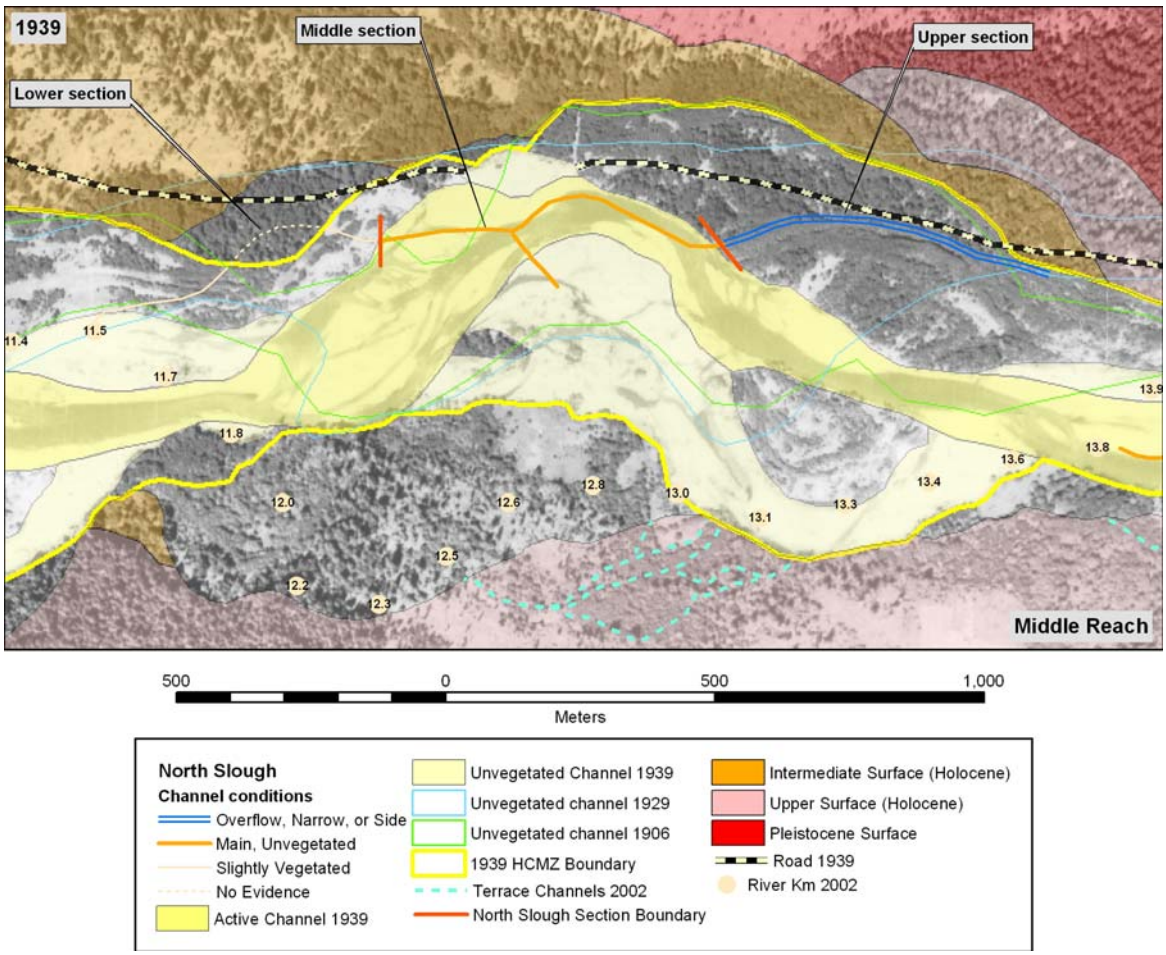

Figure 2. In 1906 (green outline) and 1929 (blue outline), North Slough was part of the unvegetated channel of the Quinault River. The slough, which is now a side channel, was probably a remnant of the Quinault River channel during these years. In 1939, the Upper section appears to have been habitat, but the Middle and Lower sections were still part of or close to the unvegetated channel complex of the Quinault River.

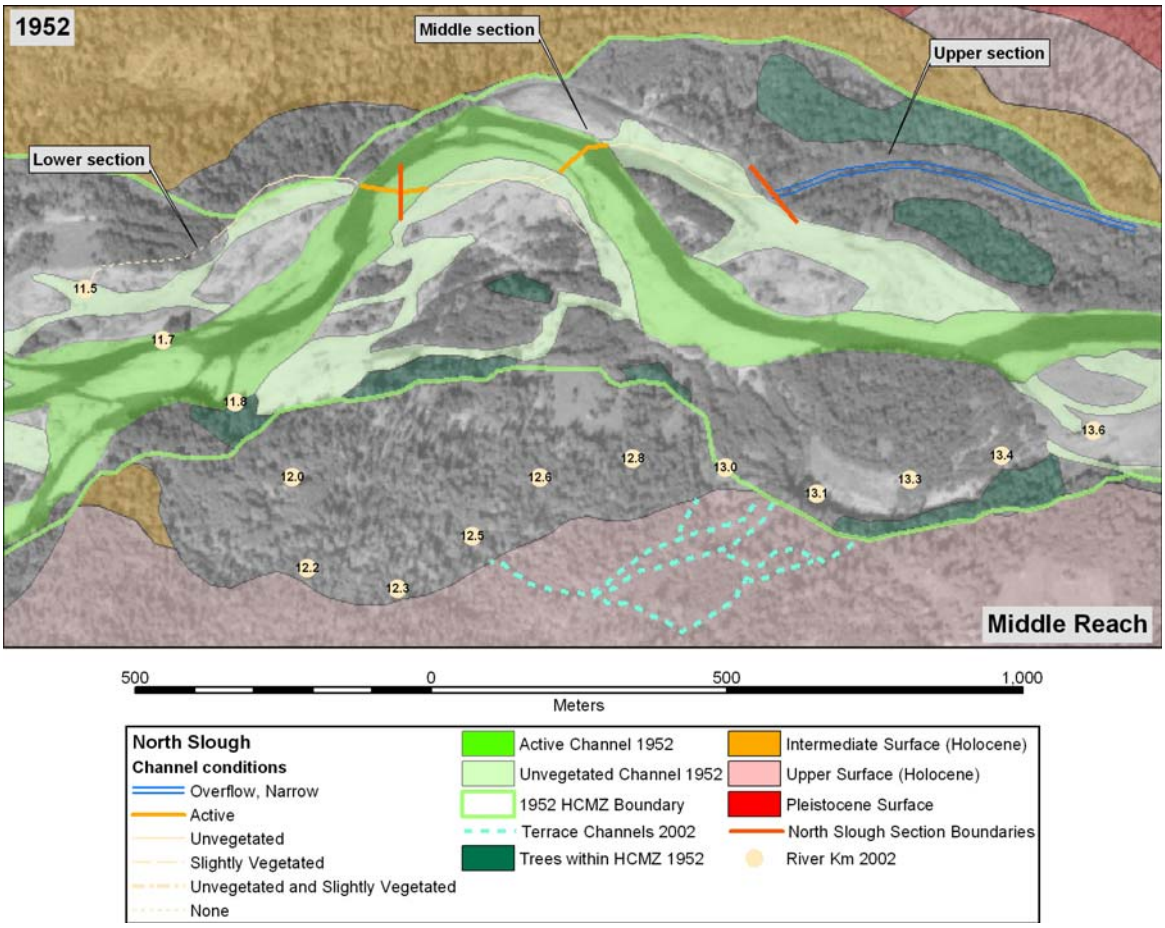

Figure 3. In 1952, the Upper section was still potential habitat, and the Middle and Lower sections were still part of or close to the unvegetated channel complex of the Quinault River, much as they were in 1939. A section of possible habitat at the downstream end of the Lower section had shortened since 1939, from about 200 m to about 50 m. This occurred because the unvegetated channel of the Quinault River moved into this area between 1939 and 1952.

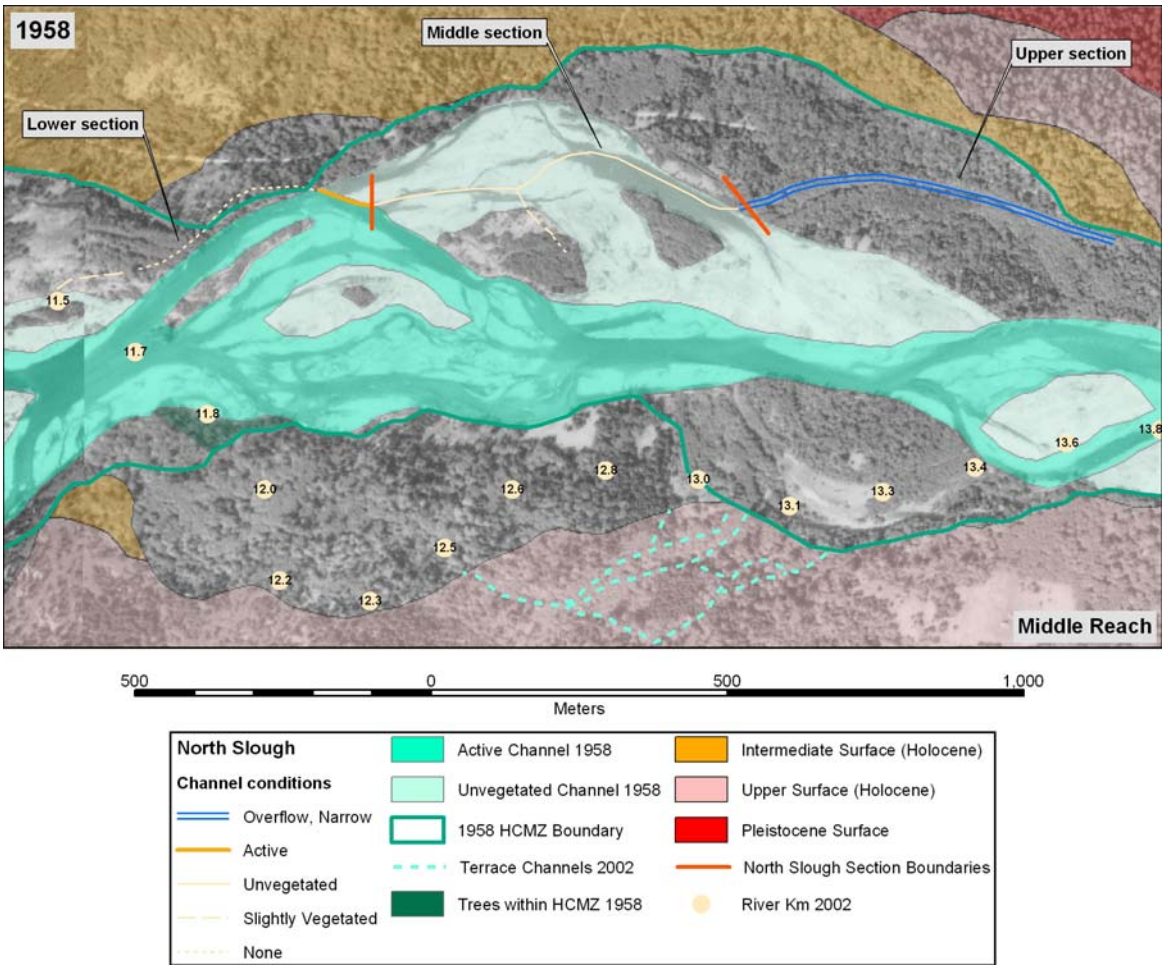

Figure 4. In 1958, the Upper section was still potential habitat, and the Middle and Lower sections were still part of or close to the unvegetated channel complex of the Quinault River, much as they were in 1939 and 1952. The active channel had moved to the south and the meander that was between RK 12.3 and RK 13.0 in 1939 and 1952 had moved downstream to between RK 12 and RK 12.8. The Middle section of the future North Slough was still part of the unvegetated channel and was not likely potential habitat. The section of possible habitat at the downstream end of the Lower section had lengthened to about 350 m as the area had become more vegetated since 1952.

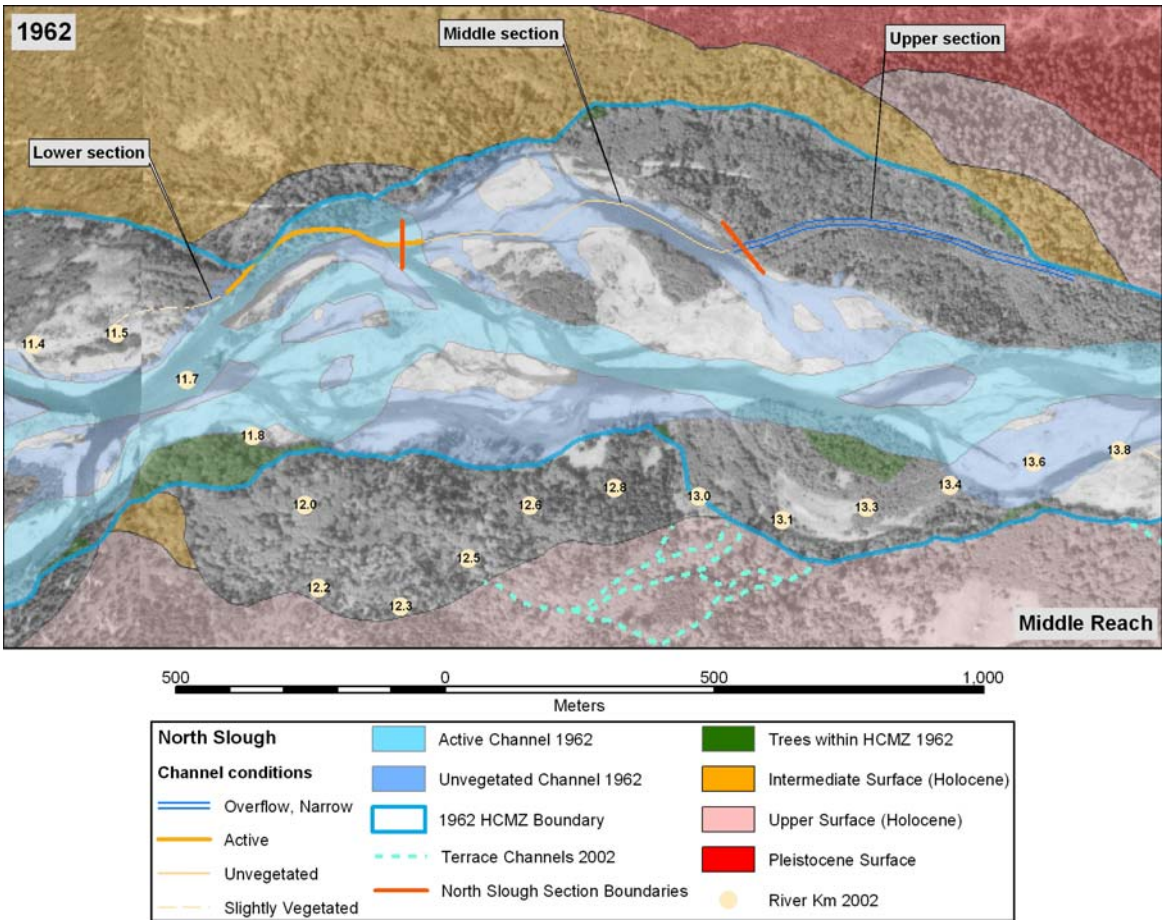

Figure 5. In 1962, the Upper section was still potential habitat, and the Middle and Lower sections were still part of or close to the unvegetated channel complex of the Quinault River, similar to their configuration since 1939. One path of the active channel had moved to the north and was north of North Slough between RK 11.8 and RK 12.3. This was part of the meander that moved progressively downstream and outward since 1939. In 1962, the Middle section of the future North Slough was still part of the unvegetated channel and was not likely potential habitat. The section of possible habitat at the downstream end of the Lower section was limited to the very downstream 150 m of the section, because the downstream migration of the active channel of the Quinault River had eliminated part of the area of riparian vegetation that was present in 1958.

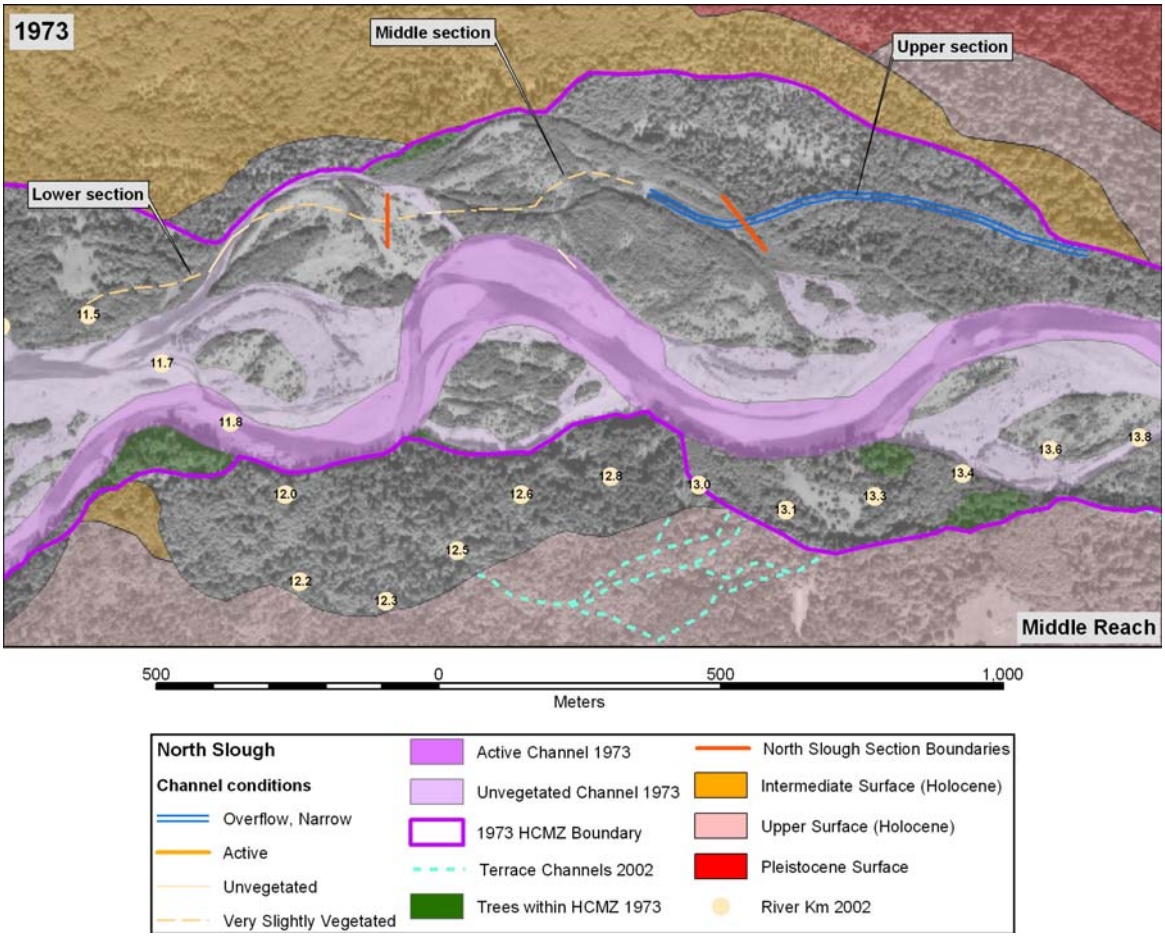

Figure 6. In 1973, the Upper section was still potential habitat. The meander in the active channel of the Quinault River that migrated downstream between 1939 and 1962 was an unvegetated overflow channel in 1973. The active channel was to the south of North Slough, and had moved away from the area of the slough. In addition, the upstream about 200 m of the Middle section flowed through riparian vegetation in 1973 and was likely potential habitat. Much of the Middle section was no longer within the unvegetated channel of the Quinault River, and riparian vegetation had started to encroach into the area. About 300 m of the Lower section was still within an unvegetated overflow channel of the Quinault River. However, the downstream about 200 m of the Lower section was within an area that was starting to become vegetated and was becoming more favorable as potential habitat.

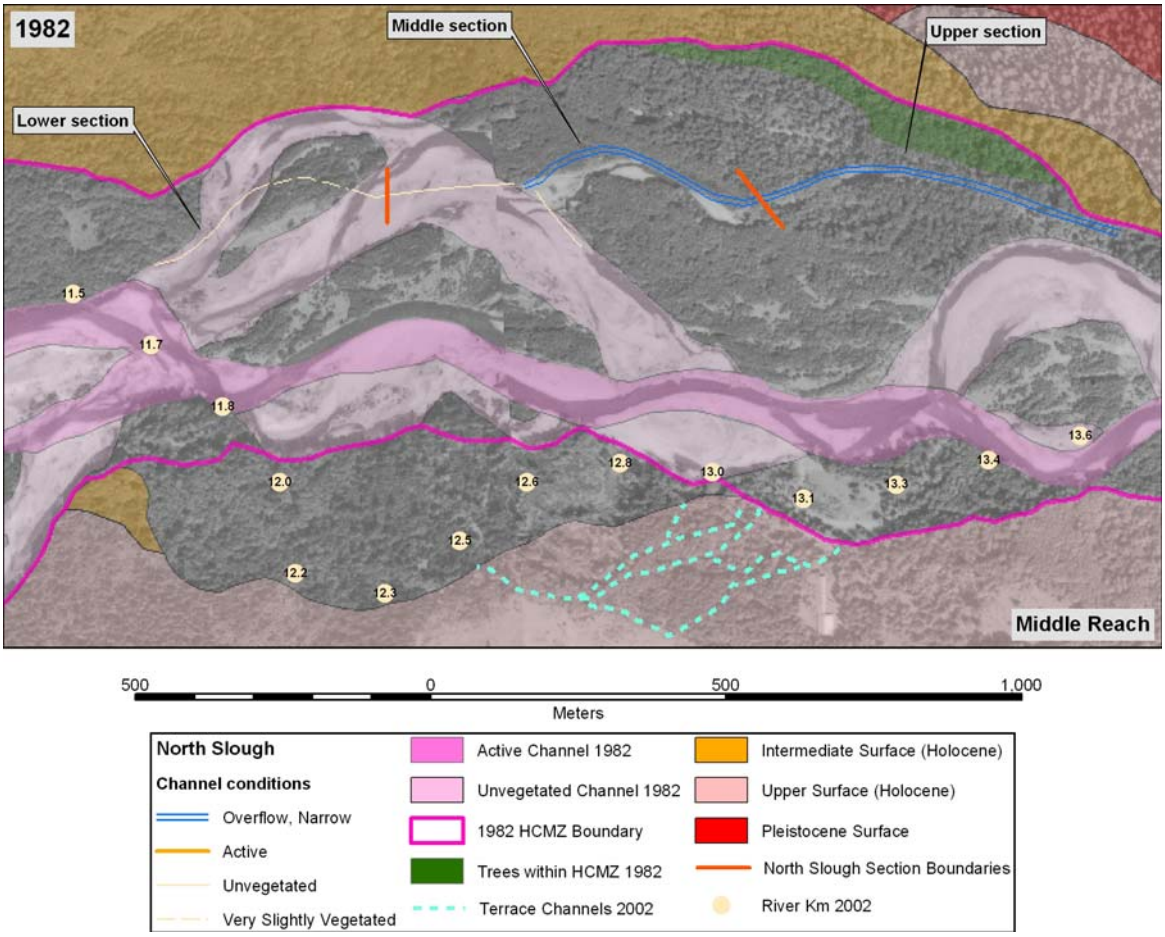

Figure 7. In 1982, the Upper section and the upstream half of the Middle section were potential habitat. The section of potential habitat was about 1800 m long. A north path of the Quinault River between RK 11.5 and RK 13.0 looks as if it had been reactivated since 1973. It was partially vegetated in 1973, but was unvegetated in 1982. Consequently, the downstream half of the Middle section and most of the Lower section were once again part of the unvegetated channel of the Quinault River. Any habitat that was present earlier had been eliminated from these sections by 1982. Since the north channel path was abandoned, the active channel became straighter, and was located south of North Slough. A couple of short (200 to 300 m) areas of possible habitat were present through vegetated areas in the Lower section.

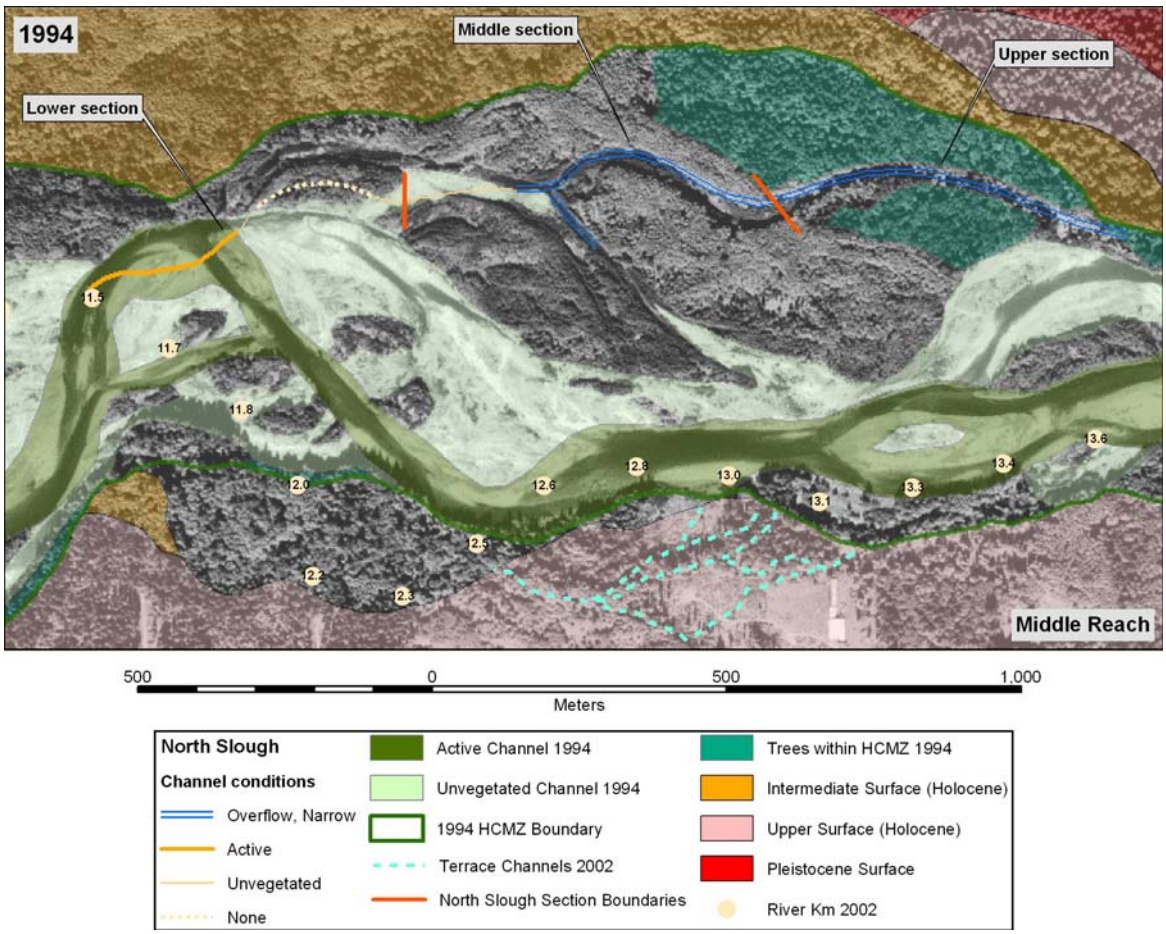

Figure 8. In 1994, the Upper section and the upstream half of the Middle section were potential habitat. This section of potential habitat was about 1800 m long. This was approximately the same length of potential habitat that was present in 1982. The north path of the Quinault River between RK 11.5 and RK 13.0 looks as if it had been abandoned again, although the downstream half of the Middle section of North Slough flowed within an unvegetated overflow channel of the Quinault River. Since 1982, a meander had formed in the active channel of the Quinault River between RK 11.5 and RK 12.3. The channel had eroded into an area that had riparian vegetation in 1982. Most of the Lower section of North Slough was within this new active channel. Consequently, the potential habitat that had formed or was forming in 1982 was gone by 1994, except for the upstream 300 to 400 m of the Lower section, which still flowed through riparian vegetation.

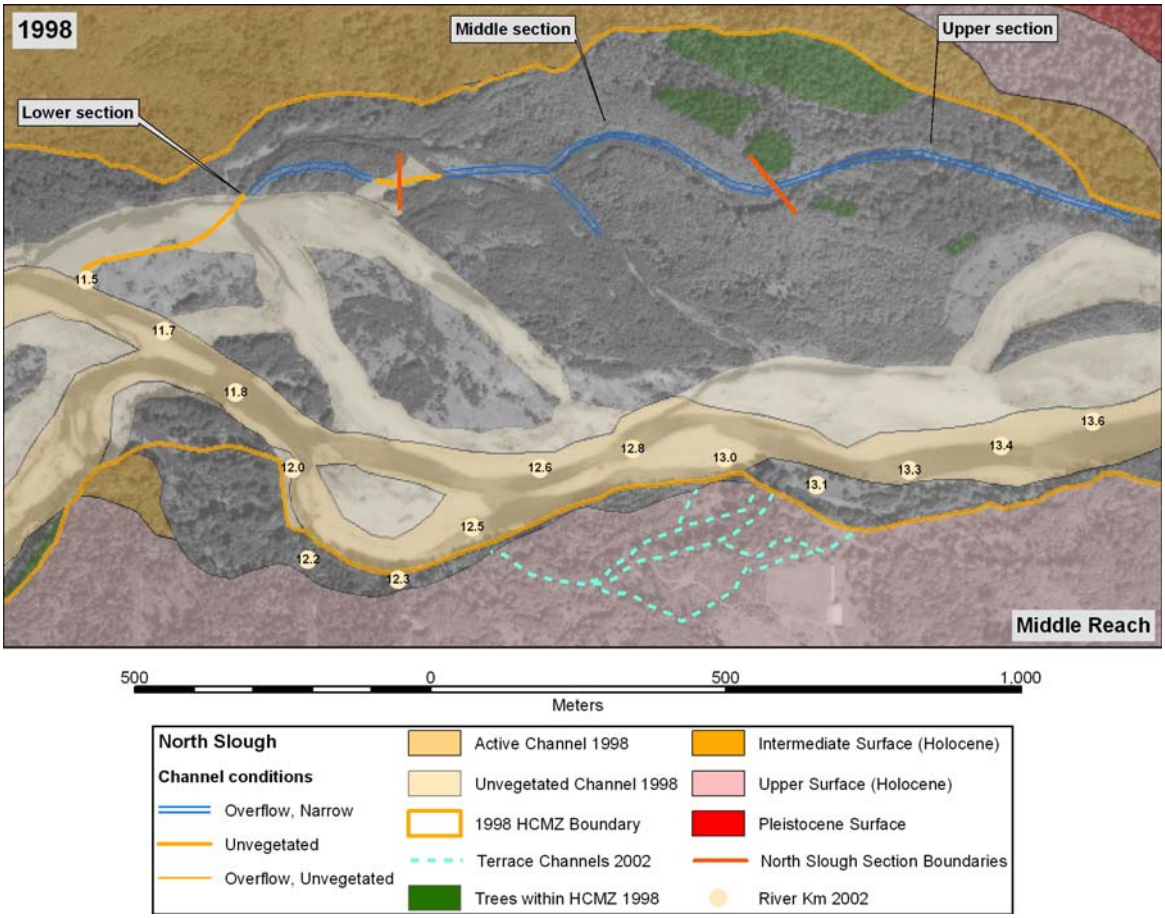

Figure 9. By 1998, the active channel of the Quinault River had moved south of North Slough. The meander that was between RK 11.5 and RK 12.3 in 1994 had moved downstream of the North Slough area. Much of the area around North Slough was covered with riparian vegetation by 1998, and most of the slough appears to have been potential habitat. The Upper and Middle sections of habitat were nearly entirely present, which resulted in nearly 1350 m of continuous potential habitat. The Upper section appears to have flowed through mixed (low shrubs and trees) vegetation, or through trees. Since the Upper section had been potential habitat through vegetation since some time between 1929 and 1939, this is about 60 to 65 years for the area to change from riparian vegetation to recognizable tree cover. The upstream about 230 m of the Lower section also was possible habitat as a narrow channel flows through riparian vegetation. A short section of about 100 m long flowed that through a remnant of an unvegetated channel of the Quinault River separated this habitat from that in the Middle and Upper sections. The downstream about 400 m of the Lower section was still part of an unvegetated overflow channel of the Quinault River and was not potential habitat.

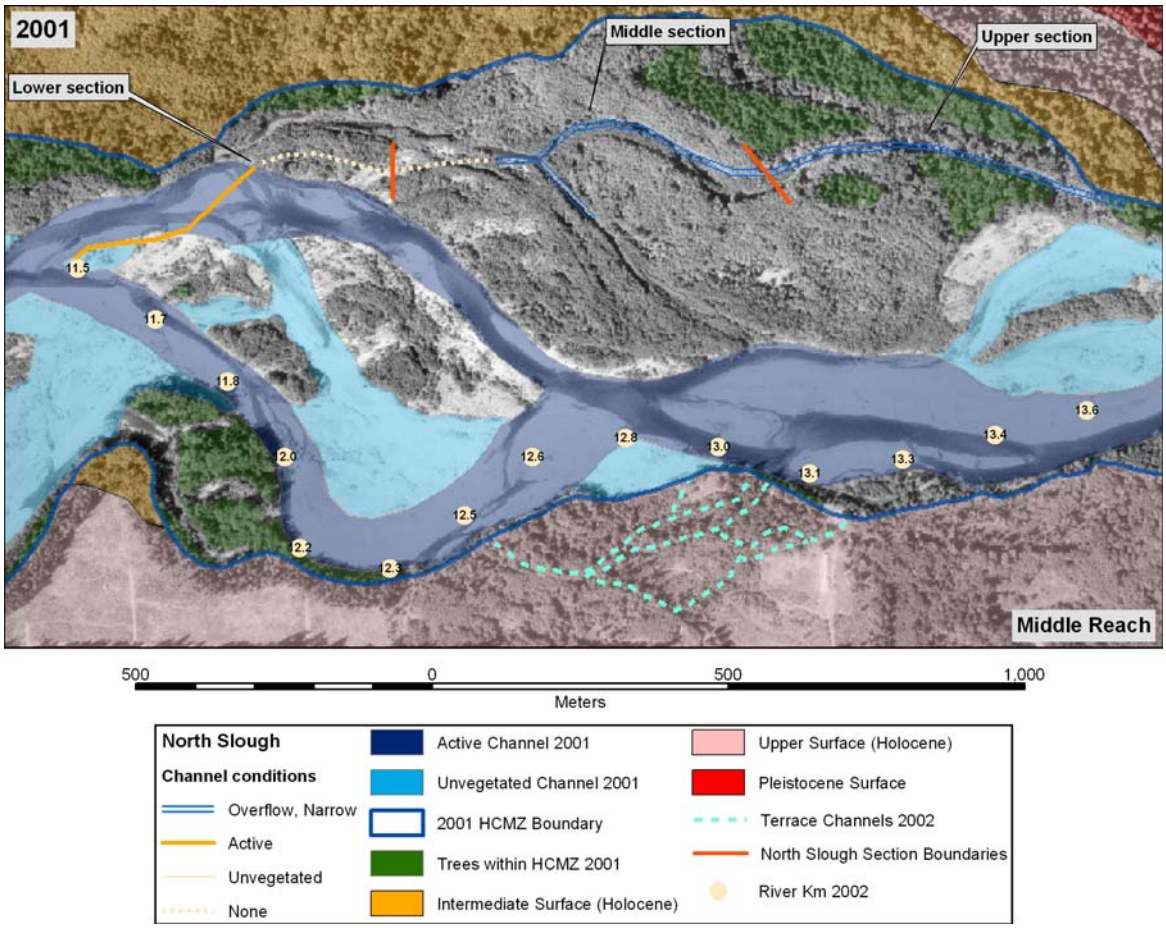

Figure 10. By 2001, the vegetation surrounding the Upper section and the upstream half of the Middle section seems to have been thicker and larger. Trees are visible along both sides of the Upper section by 2001. The active channel of the Quinault River had reoccupied a north path between RK 11.5 and RK 12.7, so that the downstream about 400 m of the Lower section was within the active channel. (This 400-m-long section was part of the unvegetated channel of the Quinault River in 1998.) The upstream about 200 m of the Lower section and the downstream about 200 m of the Middle section were within an area that was beginning to be covered with vegetation and may have been possible habitat.

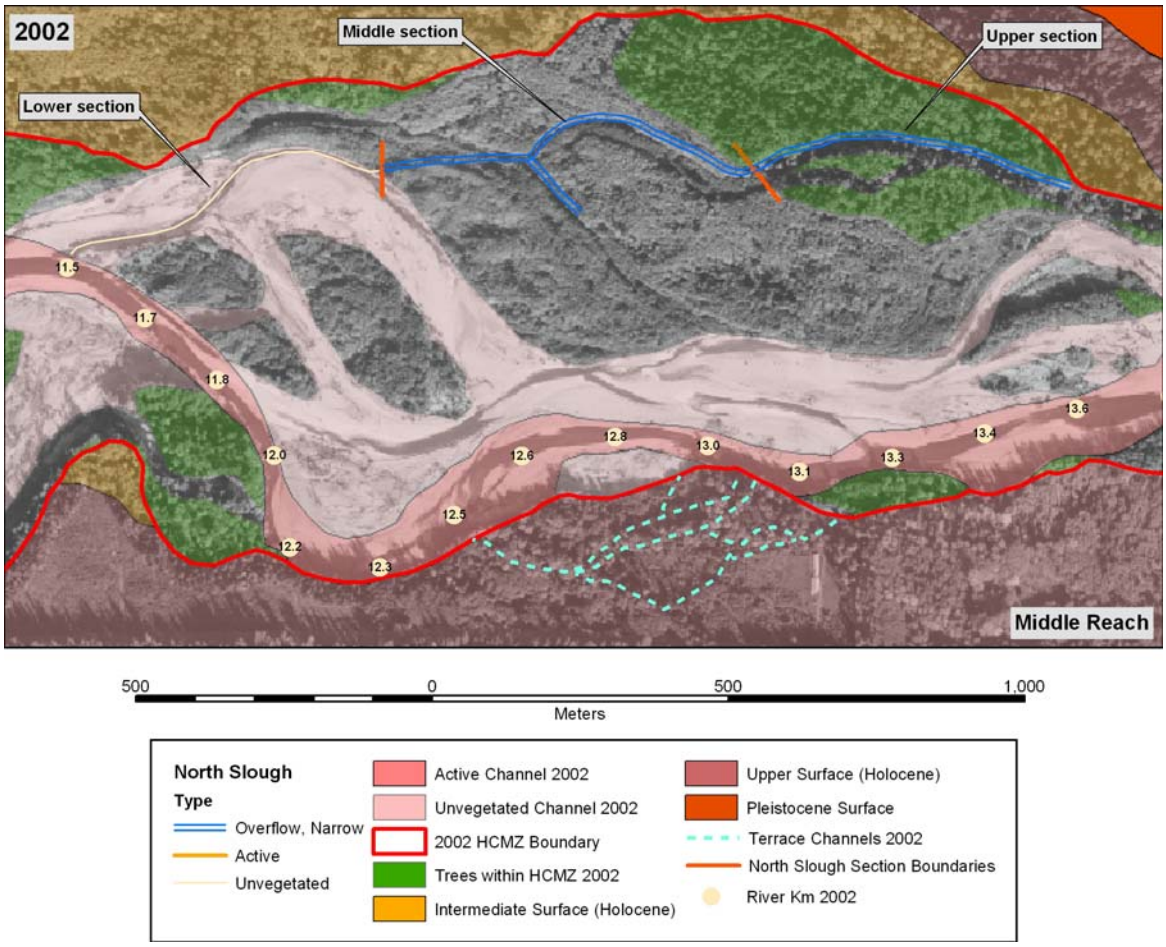

Figure 11. By 2002, the vegetation surrounding the Upper and Middle sections seems to have been more continuous, thicker, and larger than it was in 2001. Trees were present on both sides of the Upper section in 2002. The active channel of the Quinault River between RK 11.5 and RK 12.6 had move once again to the south. However, the Lower section was still within an unvegetated overflow channel of the Quinault River and probably had little habitat. Although the Middle and Upper sections have become increasingly stable potential habitat, the Lower section was still vulnerable to reoccupation by the active channel of the Quinault River.

In the summer, North Slough received underground flow. However, in winter, surface (flood) flows dominated in the slough (B. Armstrong, QIN, written commun., 2003).

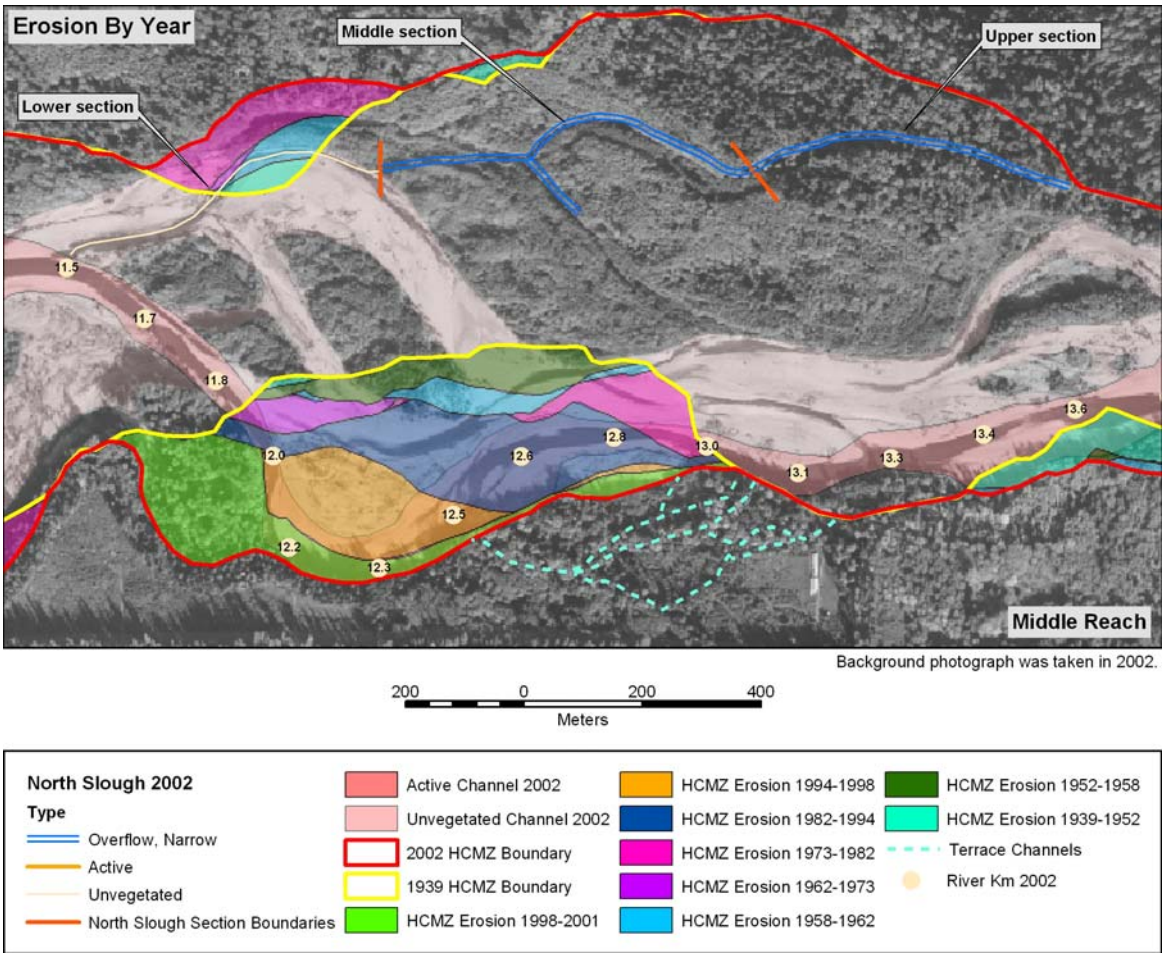

Figure 12. Bank erosion between 1939 and 2001 along the south boundary of the HCMZ allowed the Upper and Middle sections of North Slough to form as a side channel and to progressively become more stable. Erosion of the bank adjacent to the Lower section of North Slough occurred because the active channel of the Quinault River was repeated in this location. Consequently, the Lower section has not been a stable habitat area.